LM-240 Manual Lensmeter

User's Manual

LUXVISION

Notification

Dear Users,
Thank you for your purchase of LM 240 Lensmeter. Please take time to read our user's manual carefully before use.
This guarantees you to make full use of this unit and prolongs the operation life of this unit.

Precautions

If you have detected abnormal heat, smoke, noise or smell, immediately stop using the product.
In the event of an abnormality, turn off the power and disconnect the power plug from the power socket. Continuing to use the product may result in electric shock or fire.

Observe the instructions given below regarding the power cable:

- Be sure to use the supplied or specified power cable.
- Do not modify, forcibly bend, kink or pull the power cable.
- When disconnecting the power cable from the AC outlet, be sure to hold the cable by the plug.
  Pulling the cable may cause wire breakage or shot circuit, resulting in fire or electric shock.
- Do not connect or disconnect the plug of the power cable to/from the AC outlet using wet hands.
  Doing so may result in electric shock.
- Do not touch the product with wet hands while the power cable is connected to the AC outlet.
  Doing so may result in electric shock.
- If the product will not be used for a long period, disconnect the power cable from the power source. Leaving the cable connected to the power socket for a prolonged period will consume electricity and may result in heating.

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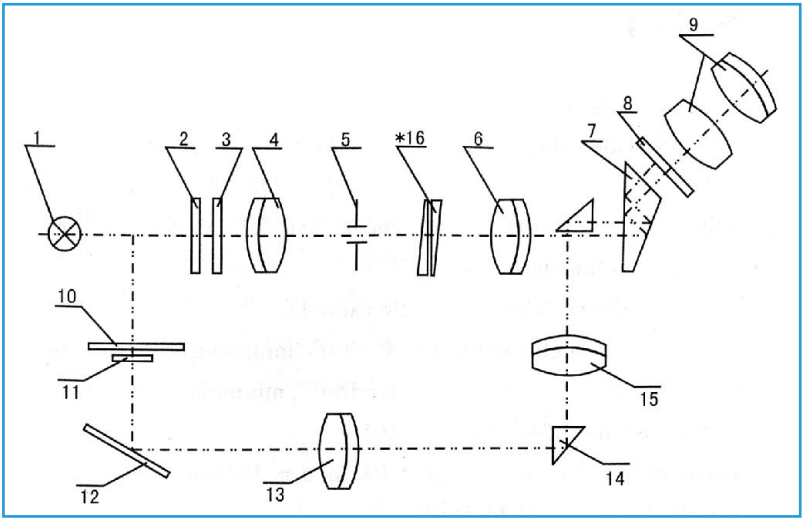
1. Function Introduction

This lensmeter is divided into 2 models, standard model and strengthened model with prism compensator.
This product is applicable to measurement testing departments, spectacles manufacturers, retail dealers of spectacles, hospital's department of ophthalmology and optical element factories for conducting measurement of spherical lens diopter, cylindrical lens diopter, cylindrical lens axis of astigmatism, prism diopter, prism basal angle and cornea contact lens diopter. In the following description, all chapters or content attached with "*" in the front are special for strengthened model device with prism compensator.

2. Working Principle Device

Fig. 1 Diagram of Optical Principle of Device



1. Light source
2. Color filter piece
3. Mark dividing plate
4. Measuring object lens
5. Diaphragm
6. Telescope objective lens
7. Half 5-edge prism
8. Eyepiece dividing plate
9. Eyepiece set
10. Reading dividing plate
11. Zero line dividing plate
12. Reflector
13. Front lens
14. Corner cube prism
15. Rear lens
*16. Prism compensator

This device consists of a coaxial optical system. The light emitted from light source 1 (illuminating lamp) passes through color filter piece 2 and lights up mark dividing plate 3. Then mark dividing plate 3, through measuring object lens 4 and telescope

objective 6, and after turning direction through half 5-edge prism 7, is imaged at eyepiece dividing plate 8. At the same time, the lighted reading dividing plate 10 and zero line dividing plate 11, through front lens 13 and rear lens 15, are also imaged at eyepiece dividing plate 8. Then, through eyepiece set 9, it is possible for human eyes to observe clear images of mark dividing plate 3, eyepiece dividing plate 8, reading dividing plate 10 and zero line dividing plate 11. In operation, place the spectacle lens at diaphragm 5 (measurement bearing seat). Turn diopter measuring hand-wheel and astigmatism axis measuring hand-wheel to have a clear image of mark dividing plate 3. Now, the scale value on the reading dividing plate 10 linked with mark dividing plate 3 is just the diopter reading of the said lens.

3. Name of Parts

First, please take a little time to have a look at picture and illustration on following 11 pages and get familiar with your device.

3.1 Viewed from front side

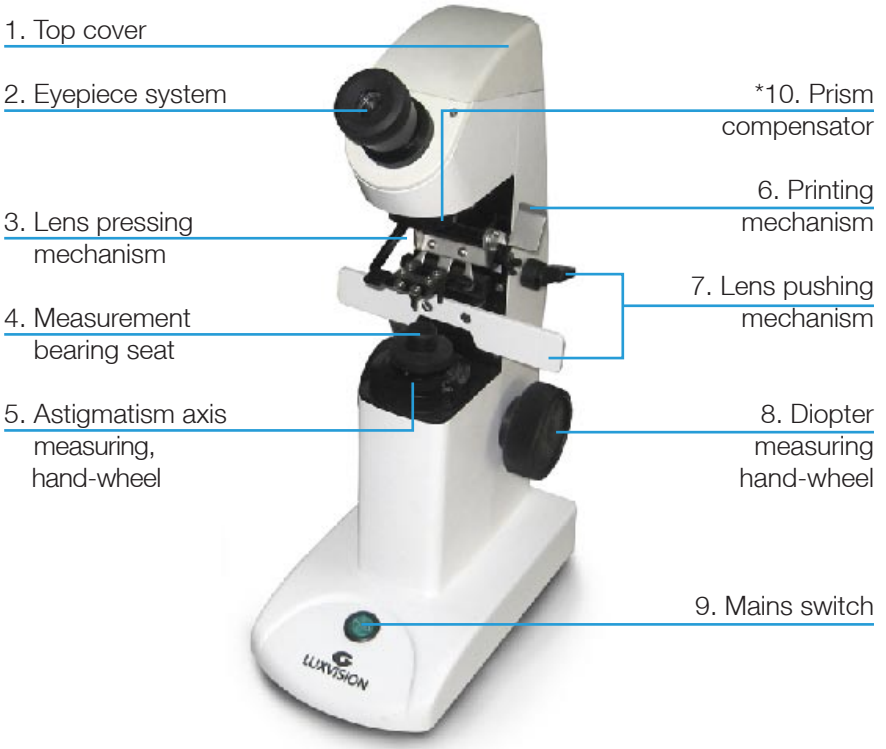


Fig. 2

3.1.1 Top cover (Fig.3)

It is an arch-shape cover plate that can be dismantled, which offers a window for professional personnel to maintain the device.

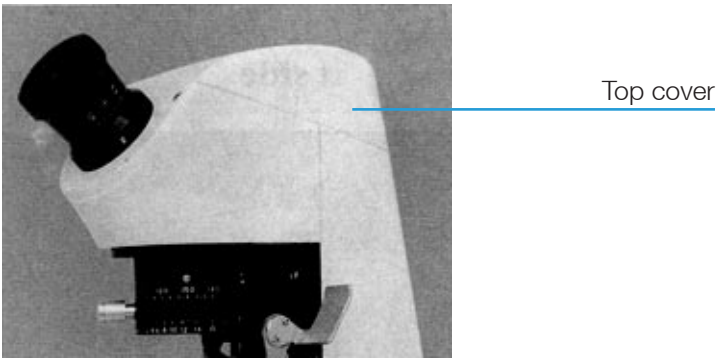


Fig. 3

Important Matters

For non-professional personnel, please do not open the top cover by yourself, and do not move internal parts either.

Warning

When moving the device, it is strictly forbidden to hold the top cover so as to avoid damage to the device (Fig.4) Correct way of moving the device: Support the body of device with one hand and hold its bottom with other hand.

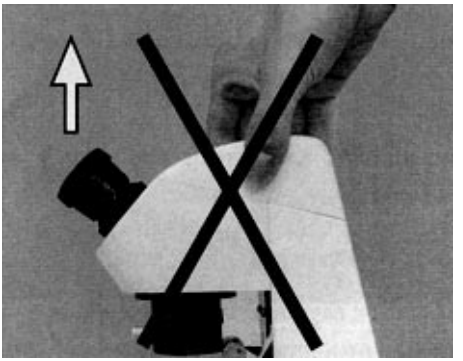


Fig. 4

3.1.2 Eyepiece system (Fig. 5)

The eyepiece system is a screw-type focusing unit with focusing range of + 5D, which can be adapted to different eyesight of human.

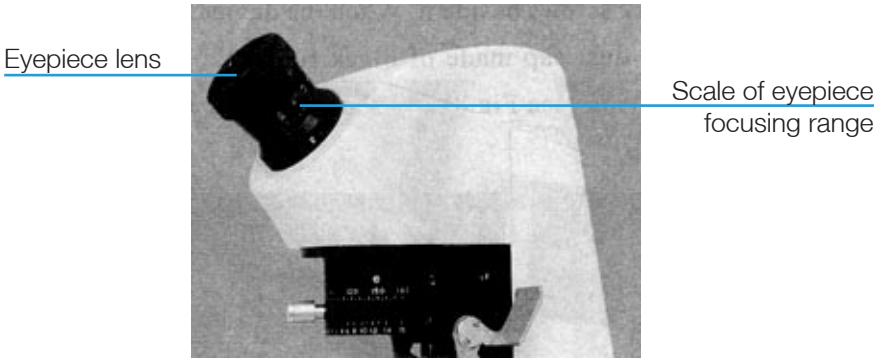


Fig. 5

3.1.3 Lens pressing mechanism (Fig.6)

In this mechanism, 3 plastic pressing feet with spring are used to press lens, where, lens with any shape of surface can be firmly pressed without damage to lens surface. In use, lift the lens-pressing handle so that the lens pressing mechanism is lowered to press the lens. After use, lift the lens-pressing handle to hang up the lens pressing mechanism.

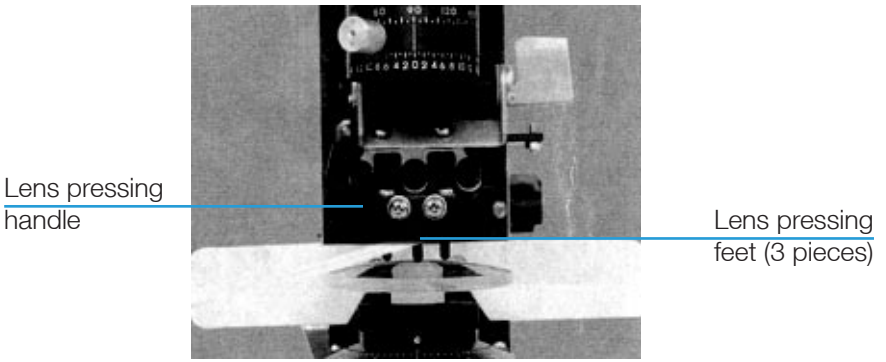


Fig. 6

3.1.4 Measurement bearing seat (see Fig.7)

It is a white nylon part that is able to firmly support lens with any shape of surface without damage to lens surface. Below it there is measuring eyepiece with 3 lock screws beside it. When the device is not used, it shall be covered with a dust cap made of black rubber to protect measuring eyepiece from dirtying (see Fig.8). When using device for measurement, take off the dust cap.

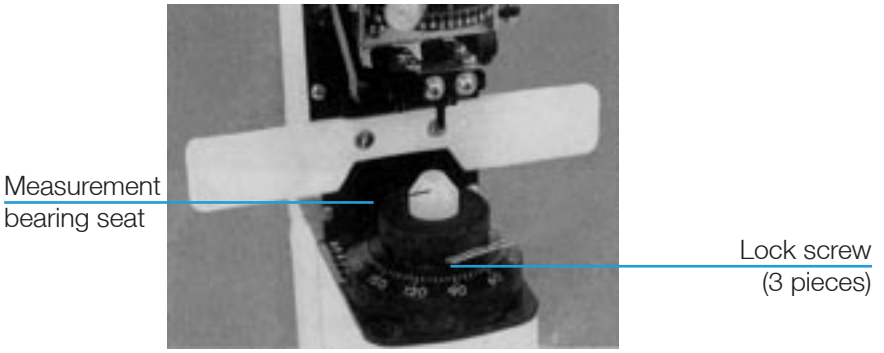


Fig. 7

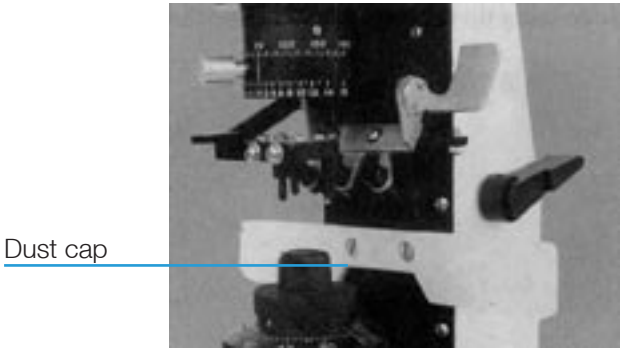


Fig. 8

3.1.5 Astigmatism axis measuring hand-wheel (see Fig.9)

It is used to measure and locate astigmaism axis angle of cylindrical lens and basal angle of prism. Its scale is identical to graduated disc of eyepiece dividing plate, whose scale range is 0 ~ 180° and scale spacing 5°.

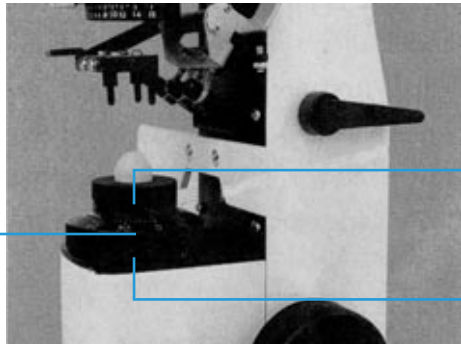


Fig.9

3.1.6 Printing mechanism (see Fig.10)

This mechanism consists of a point-making pen supporter, a point-making handle, 3 similar point-making pens connected in a line, and an inkpad box. Here, the pen in the middle is used to mark lens center, the connected point line printed by 3 pens is used to calibrate astigmatism axis angle of lens and basal angle of prism lens, and inkpad box is used to store printing ink.
When printing is required, turn the point-making handle, then ink is easily and quickly printed on the lens.

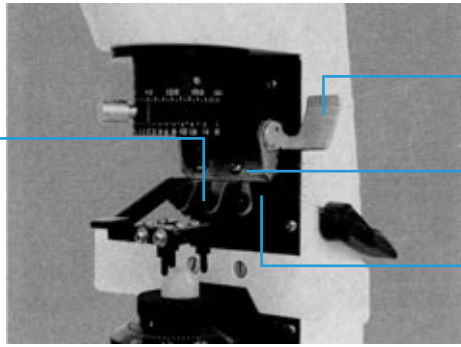


Fig. 10

3.1.7 Lens pushing mechanism (see Fig.11 andFig.12)

This mechanism consists of lens pushing handle, lens pushing plate, lens pushing pointer and lens pushing measuring scale (scale range of measuring scale is 26 cm ~ 84 cm), it is used to position lens and measure diameter of lens. When using it, turn downward the lens-pushing handle, then the lens pushing plate is pushed out forward. After use, turn upward the lens-pushing handle, then the lens pushing plate draws back. When measurement is needed, first press lens with lens pressing mechanism, then lightly move lens so as to align the center of the lens, and fix it by lens pushing mechanism. Now it is possible to read size of the measured lens and conduct other measurement.

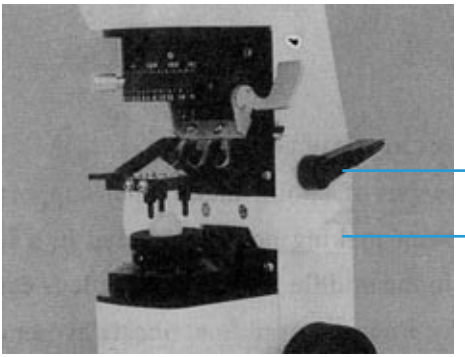


Fig. 11

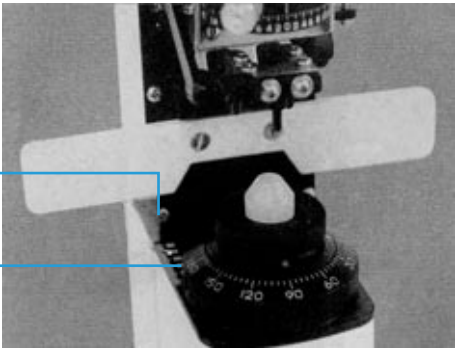


Fig. 12

3.1.8 Diopter measuring hand-wheel (see Fig. 13)

With one on the left and one on the right of device, they can be turned comfortably and smoothly. When measurement is needed, turn anyone of the hand-wheels to achieve a clear focusing, then it is possible to read diopter value of lens through reading window.

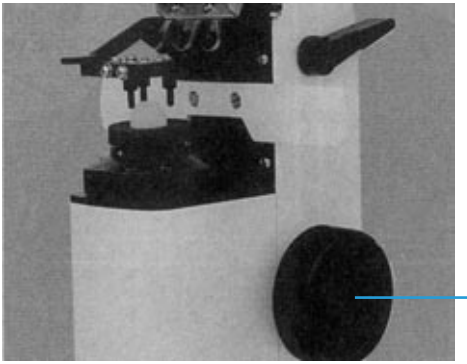


Fig. 13

3.1.9 Mains switch Please refer to Fig.2.

*3.1.10 Prism compensator (see Fig.14)

When prism diopter to be measured is higher than 5Δ, use of prism compensator is necessary. There are 2 lines of scale on the prism compensator: the upper line denotes angle, whose scale range is 0° ~ 180°, with minimum scale value of 5°; the lower line is prism diopter, whose scale range is 15Δ ~ 0 ~ 15Δ.

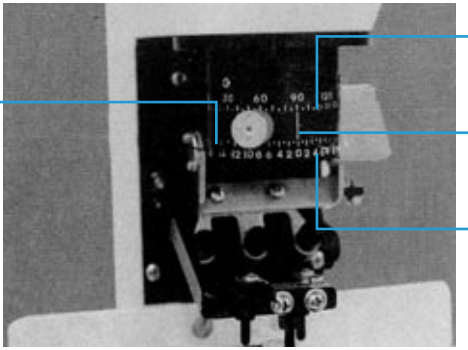


Fig. 14

3.2 Viewed from Eyepiece Set (see Fig. 15)

When viewing through eyepiece set to inside of device, one can see eyepiece dividing plate, image of mark dividing plate and reading window.

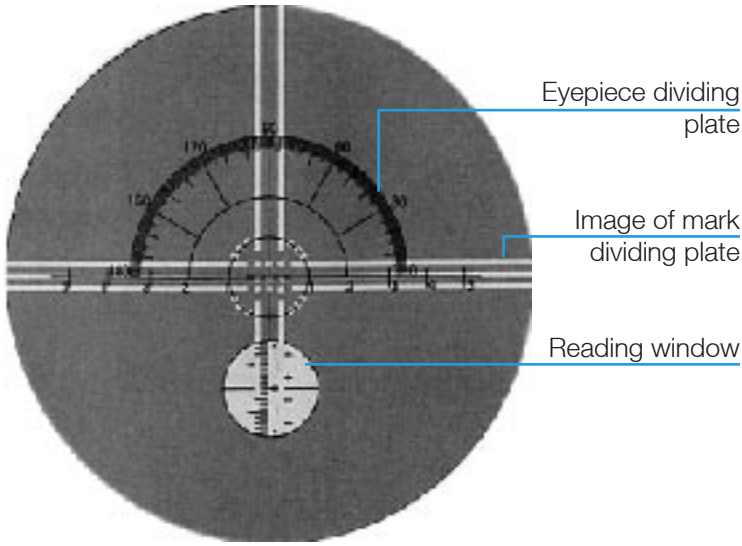


Fig. 15

Illustration of eyepiece dividing plate, image of mark dividing plate and reading window is shown as follows.

3.2.1 Eyepiece dividing plate (see Fig. 16)

Prism degree measuring scale and graduated disc are marked on the eyepiece dividing plate. Integer prism degree can be read directly from the measuring scale, and decimal fraction prism degree is reed by estimation of measuring scale. Scale range of graduated disc is 0° ~ 180° with scale spacing of 1°.

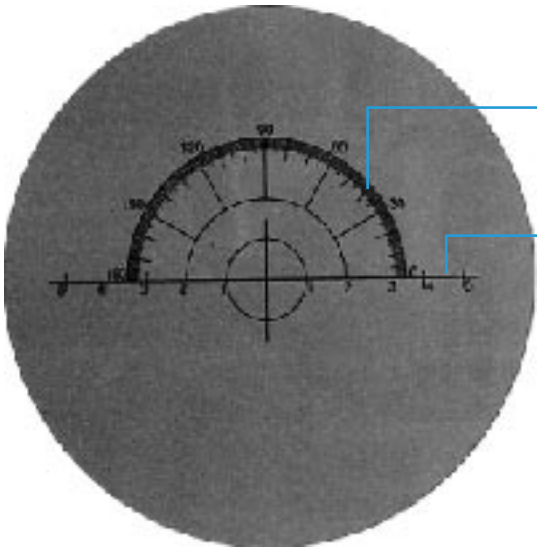


Fig. 16

3.2.2 Image of mark dividing plate (see Fig. 15)

Image of mark dividing plate is composed of 3 horizontal long green lines (cylindrical marking lines), 2 vertical long green lines (spherical marking lines)* 9 small round points in the center and a ring consisting of 12 small round points.

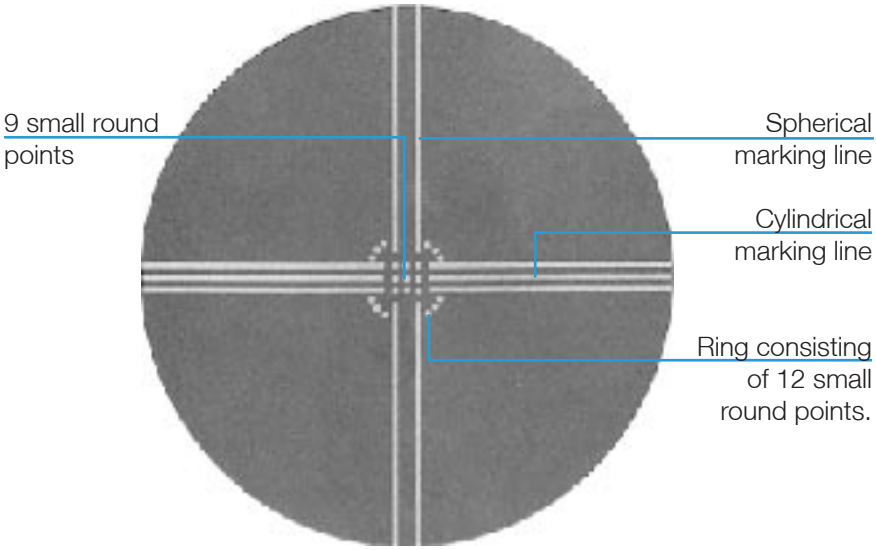


Fig. 17

3.2.3 Viewed from Bottom (Fig. 18)

In the view field of eyepiece set, reading window is located at lower part of eyepiece dividing plate. Scale range of reading dividing plate is ±25D At 0 ~ ±5D, scale spacing is 0.125D; At ±5D ~ ±25D, scale spacing is 0.25D.

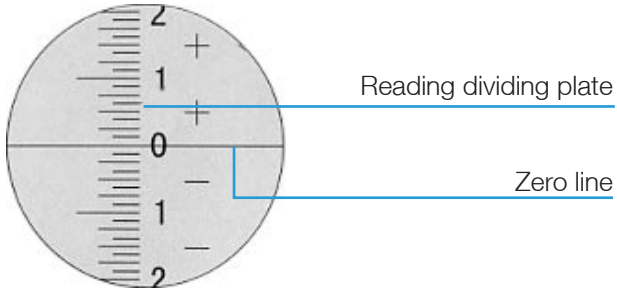


Fig. 18

3.3 Viewed from Bottom (Fig.19)

3.3.1 Bottom structure

It consists of a cover plate with 9 heat elimination holes and 4 rubber feet, where, the rubber feet are connected to base seat with M4 hexagonal round head screws.

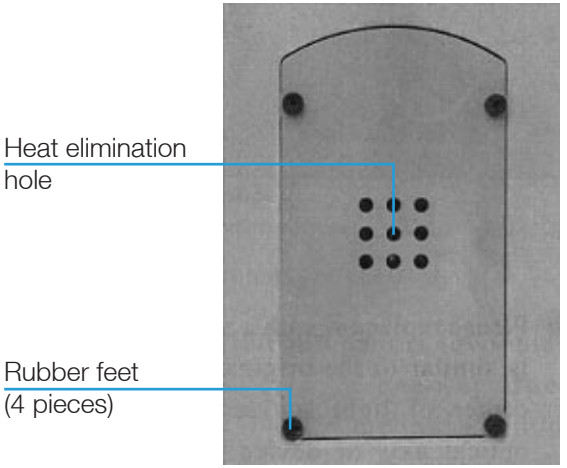


Fig. 19

3.3.2 Replacement of lamp (Fig. 19 and Fig. 20)

Procedure of replacing lamp is shown as follows:

A. Pull out power source plug, keep it cool for 10 to 15 minutes to avoid scald

B. Lay down backwards the device so that it is smoothly placed on working table.

C. Loosen 4 screws with hexagonal wrench, take off the rubber feet and then take out the cover plate.

D. Take off the old lamp and put on the new one

E. Put on the cover plate and rubber feet, and tighten 4 screws.

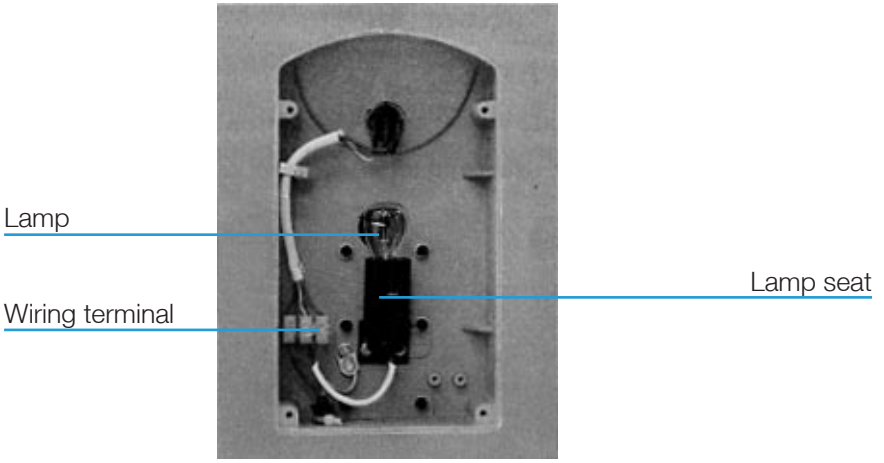


Fig. 20

Important Matters

Please replace it with a new lamp whose model is similar to the original one so as to prevent center of light source from deviating from optical axis of device that has an effect on normal measurement of device.

4. Operation

4.1 Preparation Before Measurement

4.1.1 Take off dust cap and put device on working table (the working teble shall have a proper height to the extent that the measuring person feels comfortable).
4.1.2 Switch on power.
4.1.3 Adjustment of eyepiece vision: To achieve an accurate and reliable measurement result, adjustment of eyepiece vision shall be conducted before measurement. The method: Observe black digit on the eyepiece dividing plate in the eyepiece view field while turning the eyepiece cap until the black digit becomes the clearest.

Matters Needing Attention

It is advisable to turn eyepiece cap in one-way direction because it can eliminate influence brought about by the effect of eye adjustment.

4.1.4 Zero position adjustment of device:

A. Turn diopter measurement hand-wheel to adjust graduated value in reading window to zero position. At this time, the green line on the mark dividing plate in the eyepiece view field is the clearest.

B. Turn astigmatism axis measuring hand-wheel to adjust graduated value to zero position. At this time, the long green lines on the mark dividing plate in the eyepiece view field are in the horizontal and vertical directions of view field, respectively.

***C.** Turn prism compensator measuring hand-wheel to adjust graduated value to zero position. At this lime, the green line and round points on the mark dividing plate in eyepiece view field are in the central position of the view field. After above-staled procedure is completed, the view field observed through eyepiece shall be shown as Fig. 15

4.1.5 Check if printing mechanism has ink. If no, ink shall be added.

Matters Needing Attention

Adding ink:

Turn over backwards the device on the working table. Dip in ink with brush pen and smear it on ink box so that the ink box is just wet. Do not add too much ink to avoid overflow of ink to dirty the device. Ink may be also applied directly to points of 3 point-making pens.

After above-stated procedure is finished, you may conduct testing of lens.

4.2 Measurement of Lens Diameter

4.2.1 Put the lens to be measured on the measurement-bearing seat, with concave facing downwards.

4.2.2 Release lens-pressing mechanism so that the lens to be measured can be pressed by feet of lens pressuring mechanism.

4.2.3 Turn diopter measuring hand-wheel and observe through the eyepiece so that the green lines and round points on the mark dividing plate are clearest. Then move the measured lens so that the green line center of mark dividing plate coincides with the black line center of eyepiece dividing plate. At this time, the view field observed through eyepiece shall be shown as Fig. 15.

4.2.4 Turn downwards the lens-pushing handle so that the lens pushing plate just contacts the edge of lens to be measured. At this time, the reading indicated

by lens pushing measuring scale is just the lens diameter.

Matters Needing Attention

This device is only able to directly measure spherical diameter and sphero-cylindrical diameter, and unable to measure diameter of lens with prism.

4.3 Measurement of Spherical Lens Diopter

4.3.1 Put the lens to be measured on the measurement-bearing seat, with concave facing downwards (sec Fig.6). The lower side of lens (i.e. two spectacle rings) to be measured mounted on the spectacles frame shall lean against lens pushing plate.

4.3.2 Release lens-pressing mechanism so that the lens to be measured can be pressed by feet of lens pressuring mechanism.

4.3.3 Turn diopter measuring hand-wheel and observe through the eyepiece so that the green lines and round points on the mark dividing plate are clearest (see fig. 15). As this time, reading indicated by zero line of reading window is just the spherical diopier of the lens.

4.4 Measurement of Sphero-Cylindrical Lens

Sphero-cylindrical lens means astigmatism lens whose exiternal surface is usually spherical and internal surface is cylindrical or convex (i.e. internal astigmatism). The refractive power on each section of its internal surface is different, in which, there are weakest and strongest refractive powers on 2 mutually vertical sections.

Matters Needing Attention

When measuring this kind of lens with this device, the spherical marking lines of mark dividing plate (i.e. 2 long green lines) unit cylindrical marking lines (i.e. 3 long green lines) cannot be dear simultaneously. Accordingly measurement should be carried out in separate step.

Measurement is carried out as follows:

Repeat Operation procedures 5.3.1 and 5.3.2 of 5.3 Measurement of Spherical Lens Diopter. Then operate it in accordance with following procedure.

3. Turn diopter measurement hand-wheel so that the ring of mark dividing plate (composed of 12 small green points) is imaged as clear ring-shape short cylindrical lines (see Fig. 21).

4. Turn astigmatism axis measuring hand-wheel again so that the spherical marking line (2 long lines) are in the same direction of short ring lines. In the meantime, fine-adjustment of diopter measuring hand-wheel is conducted to achieve the clearest spherical marking line (sec Fig.22). At this time, record a diopter Numerical value.

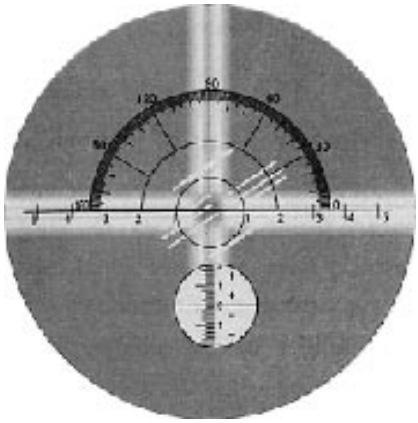


Fig. 21

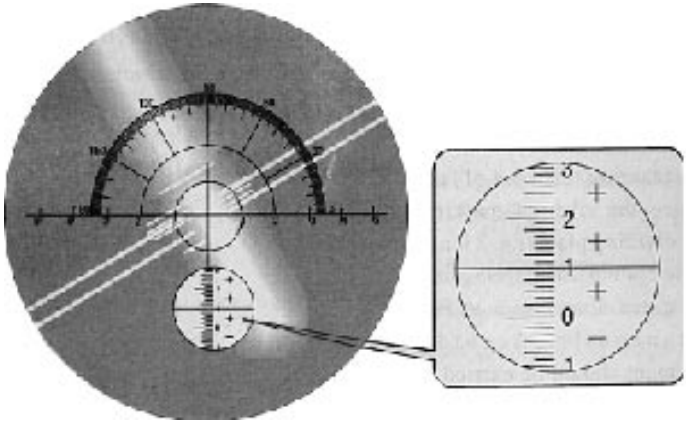


Fig. 22

5. Turn diopier measuring hand-wheel again so that the cylindrical marking line (3 long lines) are the clearest and in the same direction of short ring lines (see Fig.23). At this time, record a diopter numerical value again.

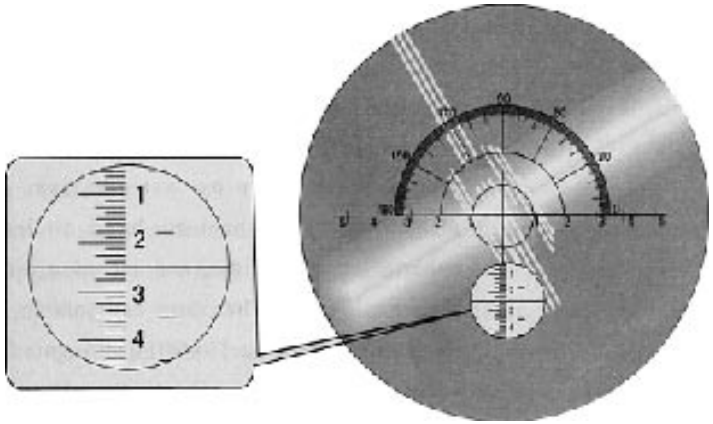


Fig. 23

6. The difference value of these 2 measurements is just the astigmatism degree of the lens.

Matters Needing Attention

Diopter of sphero-cylindrical lens may be written in many ways. Its spherical diopter may be expressed as low magnitude or high magnitude, and cylindrical diopter may be expressed as positive number or negative number, which can be realized simply by conversion of magnitude.

Important Matters

This operation instruction supposes that spherical diopter is expressed as low magnitude. Measuring procedure is shown as follows:

1. Measurement of spherical diopter; clear focusing of spherical marking line. Pay attention please: At this time, 2 clear images are attainable. Turn diopter measurement hand-wheel while turning astigmatism axis measuring hand-wheel to have a clearest spherical marking line, and record a diopter numerical value. Then turn astigmatism axis measuring hand-wheel by 90°, and again focus a clear spherical marking line, and record a diopter numerical value. Now compare these 2 reading values, taking one with smaller absolute value (i.e. low magnitude) as spherical diopter of this lens.

2. After spherical diopier is fixed, turn diopier measurement hand-wheel again to focus a clear cylindrical marking line. Record the diopier numerical value at this time (high magnitude).

3. Difference of these 2 leadings is the astigmatism degree of this lens, and its axis angle can be read directly from astigmatism axis measurement hand-wheel.

Example:
Measurement of +1DS - 3.5 DC X 30°

1. Turn diopter measurement hand-wheel while turning astigmatism axis measurement hand-wheel simultaneously so that clear spherical marking line is focused. At this time, the measured data, are: diopier + 1D, axis angle 30°. Then turn again the astigmatism axis measurement hand-wheel by 90° to focus again the clear spherical marking line. Data measured at this time are: diopter — 2,5D, axis angle 120°. Take +1D as spherical diopter.

2. Turn diopter measurement hand-wheel while turning astigmatism axis measurement hand-wheel simultaneously to have clearest spherical marking line at +1D. It is the first time reading. Turn the diopier measurement hand-wheel again so that a clear cylindrical marking line is focused. Now diopter is — 2.5D, which is the second time reading.

3. (—2.5D) - (+1D)= - 3.5D, namely, astigmatism degree is -3.5D.

4. Astigmatism axis angle of this lens is read directly from astigmatism axis measurement hand-wheel, whose value is 30°, as shown in Figs. 21, 22 and 23.

Important Matters

+ 1DS - 3.5 DC X 30° can be converted into - 2.5DS + 3.5 DC X 120°. It can be also measured using this device, which will not be described here again.

4.5 Measurement of optical center of 2 assembled lens
Put spectacles on the device. First choose anyone of lens, turn diopter measurement hand-wheel so that clearest focusing is obtained and green lines are located in the optical axis center. Make a central printing mark on this lens by the use of printer. Repeat the operation, and make central printing mark on the other lens. Now simply measure distance between central printing marks of these 2 lens with vernier caliper.

5. Maintenance

5.1 The device has been precisely adjusted before delivery from manufacturing plant. Please do not dismantle it at random so as not to influence precision of indication value.

5.2 The device shall be used in a dry and well-ventilated indoor place to prevent the optical parts from becoming mildewed after being affected with damp.

5.3 After using the device, cleaning shall be well done and it shall be covered with lens dust cap and outer case.

5.4 Strong shaking or impact shall be avoided to preventing parts from damage and looseness so as not to influence precision of measurement.

5.5 Keep the device clean, and touching surface of optical parts with hand is strictly forbidden. If dust and stains occur, absorbent cotton dipped with mixture liquid of ethanol and ether shall be used to clean it.

6. Common Trouble Shooting

No.	Trouble	Reason	Solution
1	Lamp is not lighted	It is not electrified	Make it electrified
		Lamp is out of order	Replace lamp
2	Eyepiece dividing plate cannot be seen dearly when eyepiece visual degree is adjusted	Person who receives testing has too deep myopia degree or has astigmatism	Put on spectacles
3	Green marking image can not be seen	Lamp is not lighted	Same as No. 1
		Dust cap is not taken off	Take off the dust cap
4	Green marking image can not be seen clearly	Dust exists on optical lens	Clean it with absorbent cotton dipped with cleaning liquid
5	Deviation of the center of green mark image	Lock screw is loosened	Take off eyepiece protection cap, adjust 3 screws and lock them
6	Displacement of printing mechanism	Limit screw is loosened	Adjust Limit screw and lock it
		Connecting screw is loosened	Adjust connecting screw and lock it

7. Specifications

Range of diopter measurement	0 ~ ±25 D
Minimum scale value	At 0 ~ ±5 D, it is 0.125D At + 5D ~ ±25 D, it is 0.25D
Cylindrical lens axis of astigmatism	0 ~ 180°
Minimum scale value	1°
Prism diopter Standard model	0 ~ 5Δ
Minimum scale value	1Δ
*Strengthened model	0 ~ 20Δ
*Minimum scale value	1Δ
Prism basal angle	0 ~ 180°
Minimum scale value	1°
Adjustable range of eyepiece	±5D
Measured size of lens	Φ16mm ~ Φ80mm
Overall dimensions of device	226 mm (L) X 150 mm (W) X 390 mm (H)
Weight Standard model	4.2kg
*Strengthened model	4.3kg
Illuminating lamp	220V / 110V 15W

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